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SILVICAL CHARACTERISTICS of CALIFORNIA-LAUREL

by WILLIAM I. STEIN

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CONTENTS

	Page
Habitat Conditions	2
Climatic	2
Edaphic	4
Physiographic	4
Biotic	5
Life History	6
Seeding Habits	6
Vegetative Reproduction	7
Seedling Development	8
Sapling Stage to Maturity	8
Special Features	12
Races and Hybrids	12
Literature Cited	13

SILVICAL CHARACTERISTICS OF CALIFORNIA-LAUREL

by

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Easily recognized by its aromatic evergreen leaves, and prized for its wood, California-laurel (Umbellularia californica)[1/] is unique among western hardwoods. The distinctive yet confusing characteristics of this monotypic genus are reflected by names it has been called. Its present scientific name was preceded by at least five other combinations (14).[2/]

Common names are unbelievably numerous and include the following: Oregon myrtle, Pacific-myrtle, pepperwood, spice-tree, mountain laurel, California bay tree, myrtle tree, California olive, myrtle, laurel, California sassafras, yellow myrtle, black myrtle, white myrtle, bay, bay laurel, cajeput-tree, cinnamon bush, and Coos Bay laurel (8, 11, 14, 18). The names derive from leaf, fruit, or wood characteristics and also from similarities mistaken for relationships with the myrtle trees of the Holy Land (11) and the cajeput of the East Indian Islands (14). Regional names in general use include bay, laurel, and pepperwood in northern California and myrtle in Oregon, with manufactured items marketed as myrtlewood.

The usefulness and value of California-laurel is founded mainly on the beauty and special qualities of its wood. Figured grain, colorful mottling, good workability, and lustrous finish are characteristics that insure a continuing demand. Contorted grain effects in burls and other butt and trunk excrescences of older trees are most prized but there is also a market for good straight-grained material. In most

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1/ Except for varieties named in the section RACES AND HYBRIDS, scientific and common names of trees in this publication follow: Check list of native and naturalized trees of the United States (including Alaska) (18).

2/ Underscored numbers in parentheses refer to Literature Cited.

machining qualities the wood is very comparable or superior to the best eastern hardwoods (7). High-value turnery items are the chief products; others include interior trim, furniture, paneling, veneer, cabinet woods, and gun stocks, and jaws, bits, cleats, and crossties of small boats (22, 25, 33).

California-laurel has a more extensive distribution than commonly realized (fig. 1). In north-south direction its range spans more than 11 degrees of latitude, from below the 44th parallel in the Umpqua River Valley of Douglas County, Oreg., south beyond the 33rd parallel in San Diego County, Calif. It is found as far south in the Sierras as the basin of the south fork of the Tule River and near the Mexican line close to the summit of the Coast Range (31). Jepson reports its coastal southerly extreme in Oriflamme Canon near Julian (14). Eastward from the coast, it ranges to the foothills of the Cascades in Oregon; to the northern and middle Sierras above Salinas, Calif., and to the inland side of the Coast Range south of Salinas.

HABITAT CONDITIONS

Climatic

California-laurel grows over a broad span of cool-humid and hot-dry atmospheric conditions. Data from weather stations[3/] near recorded occurrence show that laurel has endured temperature extremes of 114 and minus 6 degrees, Fahrenheit (32). Average annual temperatures at these representative stations range from 52 to 59 degrees; January averages range from 38 to 54 and July from 56 to 78 degrees (32, 35, 36). Average annual rainfall varies from 25 to 71 inches (Sierra Madre and Delta, respectively) and average annual snowfall varies from zero to about 70 inches (32, 35, 36). Rainfall in the growing season (April through September) ranges from 4 to 13 inches (32, 36). The shortest frost-free period averages 157 days and the longest, 360 (32). Higher and lower values for precipitation and temperature data could undoubtedly be found by a complete search of records from numerous weather stations located where laurel is native.

3/ North Bend and Roseburg in Oregon; Eureka, Delta, Ukiah, Colfax, Lick Observatory, Springville, Sierra Madre, and Cuyamaca in California.

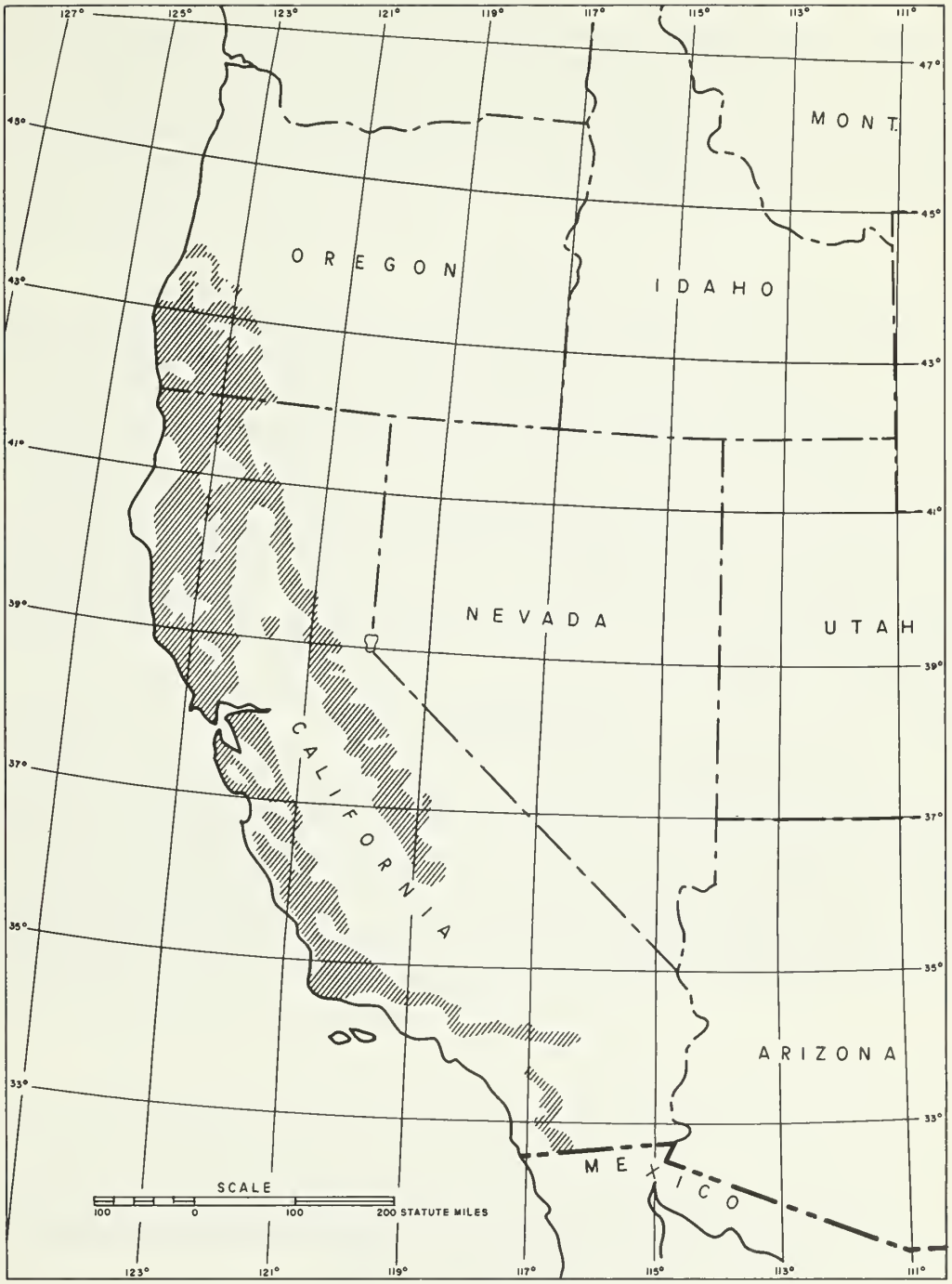

Figure 1.--Range of California-laurel.

The species has demonstrated ability to grow well and to regenerate readily outside of its natural range. Planted as an ornamental it has survived extreme low temperatures as far north as Victoria, British Columbia.[4/] Regeneration is common under untended trees at Corvallis, Oreg. Introduced into England by Douglas in 1829, the species has proved hardy in the open at Kew (4). It is damaged occasionally by severe frost at Kew, but bears fruit both there and at Bristol (4, pp. 621-622).

Edaphic

California-laurel grows on many soil types and textures provided soil moisture is constant and plentiful (31). In shrub or tree form it is found on soils derived from alluvial deposits, from sedimentary rock, from volcanic flows of the Cascades and Sierras, and from older formations in the Siskiyou Mountains, including serpentine (38). Best development and most rapid growth is on deep, well-drained alluvial fills and valley bottoms subject to inundation by high water. Growth is also good on well-watered sedimentary soils of the coastal slopes and along higher foothill streams. In dry climates laurel characteristically grows on the gravelly outwashes at the mouths of canyons and in spring-watered gulches.

Physiographic

California-laurel grows over a wide elevational range. In Oregon and most of California it is found from sea level to 4,000 feet elevation (14, 31). Near the southern end of its range, the lower altitudinal limit rises to 2,000 feet on south slopes of the San Bernardino Mountains and the upper limit approaches 5,000 feet on the west slopes of the San Jacinto Mountains (14). In the Sierras it reaches 5,000 feet in Kaweah Basin west of Sequoia National Park (14).

4/ Garman, Eric H. Information supplied by personal letter to Thornton T. Munger, Portland, Oreg. 1956.

Biotic

Generally, California-laurel is found in mixture with other species but pure stands are not uncommon. Choice pure stands were eliminated when coastal and inland valleys were cleared for agriculture and only scattered groves and tracts of large mature trees remain. Pure stands of tall young-growth are also scarce, but pure thickets or prostrate mats are common on coastal bluffs and canyons in California (14).

California-laurel occurs in four forest types and is found in association with numerous tree species. It is a minor component of the Pacific Douglas-fir, Port-Orford-cedar--Douglas-fir, redwood, and oak--madrone types (29). Were it sufficiently important, it could be typed separately as it is frequently dominant on canyon bottoms and sometimes on rocky hillsides with the oak--madrone type (29). Associates on different sites in various parts of its range include: Douglas-fir (Pseudotsuga menziesii), western redcedar (Thuja plicata), Port-Orford-cedar (Chamaecyparis lawsoniana), redwood (Sequoia sempervirens), western hemlock (Tsuga heterophylla), Sitka spruce (Picea sitchensis), grand fir (Abies grandis), Pacific yew (Taxus brevifolia), bigleaf maple (Acer macrophyllum), black cottonwood (Populus trichocarpa), Pacific madrone (Arbutus menziesii), California black oak (Quercus kelloggii), tanoak (Lithocarpus densiflorus), canyon live oak (Quercus chrysolepis), Oregon white oak (Quercus garryana), Oregon ash (Fraxinus latifolia), red alder (Alnus rubra), white alder (Alnus rhombifolia), California sycamore (Platanus racemosa), California buckeye (Aesculus californica), California torreya (Torreya californica), California live oak (Quercus agrifolia), and hollyleaf cherry (Prunus ilicifolia) (6, 11, 15, 29, 31). Eliot has also observed it associated with pine near Waldo, Oreg. (11). Undoubtedly, many of laurel's less common tree associates have never been reported.

A few observations indicate the variation found in lesser vegetation associated with California-laurel. Shrubs and herbaceous species are almost absent beneath its closed canopy (6). Only mosses, ferns, and laurel seedlings thrive in the limited light and cool, moist conditions. Increasingly open canopies permit more complex vegetation and greater density. The following species

were observed under one tall, pure stand of varying density near Roseburg, Oreg.: western swordfern (Polystichum munitum),[5/] common snowberry (Symphoricarpos albus), western red dogwood[6/] (Cornus x californica), grapeleaf California dewberry[7/] (Rubus ursinus var. vitifolius), cutleaf blackberry[8/] (Rubus laciniatus), Himalaya blackberry (Rubus procerus), elder (Sambucus spp.), and laurel seedlings.

At the other end of its range in the southern California chaparral, Cooper reports that associated shrubs include woolly manzanita (Arctostaphylos tomentosa), Jimbrush ceanothus (Ceanothus sorediatus), and golden chinkapin (Castanopsis chrysophylla), (6). It is very evident that over its long range laurel's associates include many moisture-loving, mesophytic, and xerophytic plants.

LIFE HISTORY

Seeding Habits

California-laurel flowers regularly and often profusely. Flowering has been reported to occur in all months from December to May, beginning before new leaves appear (14, 20, 21, 24, 27, 34). The small yellow-green flowers grow on short-stemmed umbels, which originate from leaf axils just behind the naked terminal bud. The flowering period is extended into late spring and early summer by the occasional appearance of flowers that originate in the axils of the current year's developing leaves (27, pp. 19-23). Trees flower at an early age; flowers have been observed on short whip-like shrubs and on 1-year-old sucker growth that originated from a long broken stub. Insects appear to be the chief aids to pollination.

Seedcrops are abundant in most years (34). Although umbels bear 4 to 9 flowers, generally only 1 to 3 fruits set (14). The age

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5/ Scientific and common names of shrubs and herbs in this publication follow: Kelsey, Harlan P., and Dayton, William A. Standardized Plant Names Ed. 2, 675 pp. Harrisburg, Pa. 1942.

6/ Known locally as creek dogwood.

7/ Known locally as wild blackberry.

8/ Known locally as evergreen blackberry.

when a tree first bears fruit, the age for maximum production, and the average quantity produced have not been observed. Seeds are produced in abundance after trees are 30 to 40 years old (12). Damage to developing seed crops by insects, birds, or rodents has not yet been reported.

The fruit ripens and falls in the first autumn following flowering (24, 27, 31, 34). The drupe, containing a single nut-like seed, falls to the ground stemless and receives limited distribution by gravity and water (31, 34). Squirrels and other rodents may have a small part in seed distribution through their storage activities.

The edible nuts are consumed in quantity by rodents and hogs. Silver gray squirrels (Sciurus griseus griseus) and dusky-footed wood rats (Neotoma fuscipes fuscipes) feed on them extensively as part of their normal diet (2). Silver gray squirrels were seen in one stand in mid-March and numerous spots bore evidence that partly buried seeds had been dug out of water-deposited silt. Hogs grow fat feeding on laurel seeds but their meat acquires a peculiar flavor (14).

The seeds appear to have transient viability under some natural conditions (31). In storage they do not keep well even at low temperature, and it is advisable to collect fresh seeds each year (34). About 300 cleaned seeds can be obtained from a pound of drupes (34).

Vegetative Reproduction

California-laurel sprouts prolifically from the root collar, stump, and trunk. Sprouts and suckers develop wherever a canopy opening admits strong light from the side or overhead. Large trees ringed with root collar sprouts and both fallen and standing live trunks entirely enveloped in new dark green sucker growth are common (14). Multiple-stemmed clumps from open-grown sprouts typically assume a distinctive, very dense and symmetrically rounded shape.

California-laurel is propagated by several commercial nurseries for ornamental plantings. It is well-known and receives moderate but widespread use as an ornamental in California and in western Oregon, western Washington, and British Columbia.

Seedling Development

Seeds reportedly germinate in autumn soon after falling (12, 27, 31) or in late winter or early spring (14, 34). In the north near Roseburg, Oreg., seeds germinate in the spring. Covered seeds germinate best but the large seeds do not bury readily without ground disturbance or silt deposition by high water. Seedling establishment is uncommon in the drier parts of California except in protected areas and where ground is well disturbed (14).

Tests in light-textured soil indicate that nearly 25 percent of untreated seeds germinate and that results are doubled with stratification (34). Germination is hypogeous and the seed remains attached to the seedling until midsummer, when the plant may be 6 to 8 inches tall (27). Seedlings soon develop a moderately stout taproot and are difficult to transplant if more than 1 year old unless grown in containers. Recovery after transplanting is often slow, and height growth may be very limited for several years.

Sapling Stage to Maturity

Growth and Yield.--California-laurel matures as a shrub or a tall forest tree. It makes best growth and development in the protected bottomlands of southern Oregon and northern California, where many mature trees are 3 to 6 feet in diameter and more than 100 feet tall (12, 14). A maximum diameter of 11.7 feet (1) and a maximum height of 175 feet have been reported (28). Over much of its range, laurel usually attains heights of 40 to 80 feet and diameters of 18 to 30 inches; but near the ocean in the chaparral, and on other severe or rocky sites it is confined to prostrate or shrub sizes (12, 14). However, even in a dry, hot climate it can become a large tree on moist sites and specimens of unusual size, diameter, crown spread, and age can be found in scores of California counties (22).

Several sources rate California-laurel growth as slow (11, 31) but on good sites in southern Oregon height growth averages between 1 and 2 feet per year. Trees in one dense pure stand were 98 to 112 feet tall and 9 to 24 inches d.b.h. at only 64 to 98 years of age (fig. 2). Understory trees appeared to put energy into height growth at the expense of diameter growth. In a small opening, an 18-year-old sapling was 22 feet tall and 2.2 inches d.b.h. Another tree under a closed canopy was 36 years old, 80 feet tall, and 7.0 inches d.b.h.

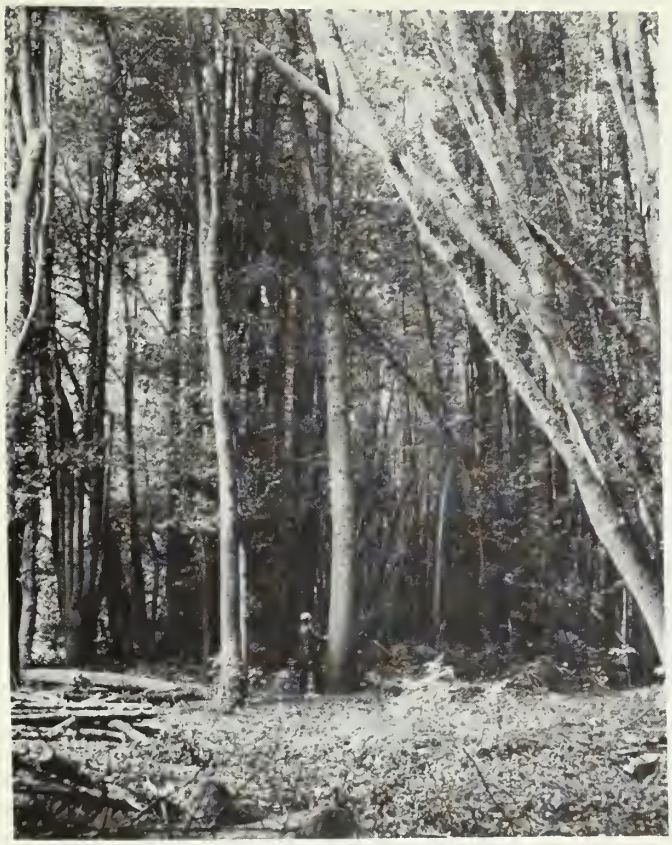

Figure 2.--Dense stand of 80- to 90-year-old California-laurel near Roseburg, Oreg.

The stand averaged 320 stems to the acre, including 288 that were 7 inches or more d.b.h. and 168 that were 12 inches or more.[9/] These observations indicate that laurel is capable of rapid growth in a full stand.

Development of multiple trunks is characteristic in both open-grown and closed stands (12, 28). Trees in the open often attain a crown spread greater than their height (14, 22) and may lose all trace of a central trunk (fig. 3). Many forest-grown trees also fork repeatedly, often within the first 10 feet aboveground. Generally each

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9/ If measurable at or near d.b.h., several stems on one root system were counted as separate trees.

Figure 3. --Young multiple-stemmed California-laurel 12 to 20 feet tall near Coquille, Oreg. Area was cut about 20 years ago and is now lightly pastured.

fork grows vertically and side branches die. Adjacent forked and unforked trees make similar height growth.

Reaction to Competition. --California-laurel's degree of tolerance is uncertain. Several writers have rated it as very tolerant throughout life (11, 31) but in Baker's poll 55 percent of the foresters replying rated the species as tolerant and the rest placed it in the intolerant class (3). A very dense canopy is formed by its thick evergreen leaves, which persist 2 to 6 years and are closely spaced along twigs on numerous shoots and branches (14, 31). That laurel is not tolerant of its own shade may be indicated by three observations under a closed canopy: (1) The presence of many small seedlings but no saplings, (2) long boles clear of live limbs, and (3) some evidence that pole-sized trees must compete successfully in height growth or die. However, these indicators are no criteria of relative tolerance with other species, and large trees are found beneath a moderately dense conifer canopy.

Damaging Agents. --Wind and snow cause appreciable destruction and deformation in California-laurel stands. Blowdown is common during severe north or southeast wind and rain storms in California (14). Storms in southern Oregon during the winters of 1951 and 1955 were observed to cause damage; coming at a time when the soil was saturated or flooded, numerous trees in one dense pure stand on alluvial soil blew down. Wet clinging snow in 1955 aided windthrow, broke tops, and split forks. Laurel's roots are generally described as fleshy, deep, and wide-spreading (12, 23, 27) but this blowdown demonstrated that the root system may also be quite restricted and without a prominent taproot. Striking examples of crown deformation by strong winds are numerous near the coast, and Jepson states that no California tree responds more easily to molding by wind (14).

Because of thin-bark the tree is easily top-killed by fire, but it resprouts very rapidly. It often forms dense brush clumps on burned cut-over land, which may prevent the establishment of desired conifers.

More than thirty species of fungi have been observed on California-laurel but only three (Anthostoma oreodaphnes, Nectria umbellulariae, and Sphaerella umbellulariae) are restricted to this tree (27). These three cause no serious damage, but rot in laurel is common. Rainbow conk (Polystictus versicolor), a saprophyte that attacks dead wood and wood in storage, is the chief offender. [10/] Even in young stands, dead knots, stem malformations and root collars are often decayed. Total cull[11/] in one northern California dissection study averaged 7 and 10 percent of the gross cubic volume in trees of saw-log or cordwood size and quality, respectively (17). To minimize sapstain, logs must be yarded and utilized rapidly (25).

California-laurel has no serious insect enemies. A leaf miner (Cameraria umbellulariae) and a leaf beetle (Dichelonyx valida) cause some damage to live leaves (16). An imported scale (Icerya purchasi) used to be very damaging but through biological means it is now under control (27). Another scale insect (Aspidiotus camelliae) is often numerous on the bark (27) but is of minor importance.

10/ Bunnell, Wendell E. Oregon myrtle: being a treatise on the utilization of Oregon myrtle in logging, milling, and marketing. (N. d.) (Unpublished thesis presented to the Oregon State College, School of Forestry. 94 pp.)

11/ Total cull includes decayed wood, shake, fire scars and poor form, but excludes breakage caused by logging.

Animals appear to cause only minor damage to California-laurel. Goats graze it sparingly but livestock seldom, if ever, browse it unless extremely short of other food (8). Hogs eat the roots (37). Van Dersal states that laurel has slight importance as browse for mule deer, and Longhurst lists it as a principal game browse species for the North Coast ranges of California (19, 37). Probably the "hedging" of sprouts by deer is the only significant damage.

SPECIAL FEATURES

All parts of the tree have served human needs. Hudson Bay trappers brewed a comforting tea from the leaves to remedy chill (26). David Douglas learned that hunters made a drink from the bark and declared it "by no means an unpalatable beverage" (13). Native Indian tribes ate substantial quantities of the fruit and seeds, made a drink from bark of the roots, and used the leaves for many internal and external medicinal purposes, including vermin control (5). Dried leaves are used for seasoning meats and soups (20).

Extracts of the leaves, wood, and fruit have strong chemical properties. Vapor from the aromatic leaves can cause sneezing, headache, sinus irritation, other severe discomforts, and even unconsciousness (9). The leaves contain considerable menthol, (34) and the ketone and umbellulone obtained from their oil interferes severely enough with respiration, heart beat, and blood circulation to cause death in laboratory animals (9). Umbellulone also has bactericidal and germicidal properties (9). Oil from the wood, leaves, and fruit has been used for treating catarrh, nervous disorders, rheumatism, meningitis, intestinal colic, and dyspepsia, but is probably no longer sold for pharmaceutical purposes (22, 27, 30).

RACES AND HYBRIDS

Several racial variations are recognized. U. californica var. pendula Rehd. is an uncommon, broad-spreading tree distinctive for its pendulous branchlets which contrast strongly with typical ascending branch growth (24). U. californica var. fresnensis can be distinguished by the fine white down on the lower surfaces of the leaves and on the branches of the panicle (10). Several forms that Jepson describes--gregarious, rockpile, dwarf, and prostrate--may indicate other variety differences.

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